



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/732,705	12/10/2003	Fritz Schwertfeger	WAS 0610 PUS / Wa 10244-S	7447
22045 7590 02/21/2007 BROOKS KUSHMAN P.C. 1000 TOWN CENTER TWENTY-SECOND FLOOR SOUTHFIELD, MI 48075			EXAMINER DEGHAN, QUEENIE S	
			ART UNIT	PAPER NUMBER
			1731	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/21/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/732,705

Applicant(s)

SCHWERTFEGER ET AL.

Examiner

Queenie Dehghan

Art Unit

1731

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 25-29 is/are pending in the application.
- 4a) Of the above claim(s) 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 25-29 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of claims 1-15 in the reply filed on December 6, 2006 is acknowledged. The traversal is on the ground(s) that the sintering of crucibles with an electric arc produces foreign atom impurities. This is not found persuasive because the product claims do not refer to foreign atom impurities. Furthermore, the product claim recites the limitation of the bubble concentration in the product, which is reduced by the use of a vacuum. Hence, to make the crucible product, with a low bubble concentration, one skilled in the art would sinter the crucible, via several different ways including a furnace, electric arc, and lasers in a vacuum. Therefore, the product is not limited to the method of claim 1.

The requirement is still deemed proper and is therefore made FINAL.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The temperature range of claim 11 is not disclosed in the specification.

Claim Objections

3. Claim 2 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to

Art Unit: 1731

cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 2 is unclear as to how the properties of the bubbles resulting the product further limits the method of claim 1.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 4-6, 15 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tumminelli et al. (5,196,041) and Brüning et al. (4,416,680).

Tumminelli et al. disclose the sintering of a SiO₂ body with formed from unsintered silica soot with a CO₂ laser, which has a wavelength greater than the absorption edge of

Art Unit: 1731

silica glass at 4.2 μ m (col. 2 lines 30-43, col. 3 lines 10-24, col. 4 lines 3-6). Brüning et al. disclose a method for sintering a SiO₂ body, such as a crucible in an atmosphere of subatmospheric pressure below 1000mbar (abstract, col. 2 lines 5-30). Brüning et al. also disclose a crucible with an inner side and an outer side, wherein on the inner side is sintered (col. 2 lines (abstract, col. 2 lines 16-25, col. 3 line 64 to col. 4 line 20).

Brüning et al. also mention that the crucible made is bubble free (col. 2 lines 5-6). It would have been obvious to one of ordinary skill in the art at the time the invention was made to adapt the teaching of Brüning et al. for sintering in vacuum for the process of Tumminelli et al. in order allow for the production of a SiO₂ body free from bubbles for use in the pulling of silicon crystals, as taught by Brüning. It would have also been obvious to one of ordinary skill in the art at the time the invention was made to utilize CO₂ laser sintering step of Tumminelli et al. in the process of Brüning et al. because it allows for the localized and selective sintering of the desired portions of the SiO₂ body and because Tumminelli et al. has demonstrated that it is known in the art to utilize CO₂ lasers for the sintering of SiO₂ bodies.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tumminelli et al. (5,196,041) and Brüning et al. (4,416,680) in view of Sato et al. (5,989,021). Tumminelli et al. and Brüning fail to teach the resultant pressure of the bubbles in the SiO₂ body formed. Although it is not clear how claim 2 is a method step, Sato et al. teach the method of making a SiO₂ body under vacuum, such as a crucible used for the pulling of a single crystal, wherein the crucible have bubbles with a lower internal pressure than the pulling pressure used to pull a single crystal (abstract, col. 3

Art Unit: 1731

lines 15-63). It would have been obvious to one of ordinary skill in the art at the time the invention was made to expect the SiO₂ body of Tumminelli et al. and Tumminelli and Brüning et al. to have bubble with a lower internal pressure than the pulling pressure used to pull a single crystal, since Sato et al. has demonstrated the use of vacuum while sintering results in such a crucible.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tumminelli et al. (5,196,041) and Brüning et al. (4,416,680) in view of Oswald et al. (7,069,746). Tumminelli and Brüning fail to teach holding the SiO₂ body in a helium atmosphere before applying the subatmospheric pressure. Oswald et al. teach a method for sintering a porous SiO₂ body comprising the steps of holding the SiO₂ green body in a helium atmosphere before a subatmospheric pressure is established (col. 3 lines 35-39, col. 16 lines 54-67, col. 17 lines 26-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the helium step Oswald et al. in order to reduce the chance of water content causing bubbles in the green body while sintering, as taught by Oswald et al.

9. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tumminelli et al. (5,196,041) and Brüning et al. (4,416,680) in view of Günter et al. (5,190,791). Tumminelli et al. and Brüning et al. fail to mention the spot diameter of the laser used for sintering. Günter et al. teach the use of a CO₂ laser for contact free heating of a surface in a uniform and continuous manner, wherein the surface was browned or sintered with a laser with a focal spot diameter of 11cm (abstract, col. 3 lines 37-61). It would have been obvious to one of ordinary skill in the art at the time the

Art Unit: 1731

invention was made to utilize the large focal spot diameter of Günter et al. in the process of Tumminelli et al. and Brüning et al. because to cover a large area of the surface for sintering, just as Günter et al. has done.

10. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tumminelli et al. (5,196,041) and Brüning et al. (4,416,680) in view of Takita et al. (5,021,073). Tumminelli et al. and Brüning et al. fail to mention a sintering temperature between 1400-1500°C. Takita et al. teach the sintering of silica particles with a sintering temperature of 1480°C (col. 2 lines 18-31, col. 4 line 39). Although sintering is not done specifically, one of ordinary skill in the art would be able to set up the laser beam with the desired focal length and diameter to impart the desired temperature on the surface that the laser beam is sintering. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize sintering temperature of Takita et al. in order to reduce energy cost required for high sintering temperatures, since a lower energy is required for the lower sintering temperature of Takita et al.

11. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tumminelli et al. (5,196,041) and Brüning et al. (4,416,680) in view of Murnick 95,427,825). Tumminelli et al. and Brüning et al. fail to mention the laser energy of the laser beam used for sintering. Murnick teaches the use of laser energy for various heating and processing steps (such as fusing and annealing) for ceramics, such as glass. By controlling the focus of the laser beam, one of ordinary skill in the art can adjust the desired energy density of the beam. Murnick also provides an example where the laser beam with an energy density of 200W/cm² is used on a ceramic surface

Art Unit: 1731

(col. 3 lines 45-67, col. 9 lines 39-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teaching of the Murnick to adjust the laser beam of Tumminelli et al. and Brüning et al. to the desired energy density of $200\text{W}/\text{cm}^2$ in order to sinter the SiO_2 body because Murnick has demonstrated that it known in the art to achieve such an energy density with a laser for processing of ceramic materials and doing so will result in a larger beam spot diameter for covering a larger area of the surface for processing.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tumminelli et al. (5,196,041) and Brüning et al. (4,416,680) in view of Shen et al. (2003/0059334). Tumminelli et al. and Brüning et al. fail to mention measuring the temperature of the focal spot. Shen et al. teach sintering with a laser beam and the step of measuring the temperature of the focal spot of the laser and adjusting process parameters (abstract, [0028], [0029], [0030]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the temperature measuring step of Shen et al. in order to adjust the laser beam of Tumminelli et al. and Brüning et al. to allow for better control of the laser output and more uniform heating.

13. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tumminelli et al. (5,196,041) and Brüning et al. (4,416,680) in view of Sato et al. (5,766,291). Brüning et al. disclose the use of a reduced pressure of 1000Pa (or 10mbar) in the sintering of the SiO_2 body, but do not disclose a reduced pressure between 0.01mbar and 1mbar. Sato et al. teach sintering a SiO_2 body under a reduced pressure of 13Pa (or 0.13mbar). It would have been obvious to one of ordinary skill in

Art Unit: 1731

the art at the time the invention was made to utilize the pressure of Sato et al. in the sintering of the SiO₂ body of Tumminelli et al. and Brüning et al. because Sato et al. has demonstrated that this reduced pressure results in the elimination of bubbles in the SiO₂ body when sintering (col. 2 line 65 to col. 3 line 2).

Double Patenting

14. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

15. Claims 1, 9-10, 13, 25 and 26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 12-13, and 15-17 of copending Application No. 10/855,126. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1 and 15 of the copending application '126 recite the same limitations of claim 1 in the current application, which is the sintering of a SiO₂ body with CO₂ laser in reduced

Art Unit: 1731

pressure. Additionally, claims 5, 13, 13, 16, 17 of application '126 recite the same limitation as claims 13, 9, 10, 25, and 26 of the current application, respectively.

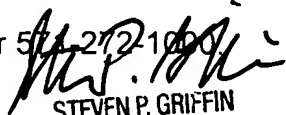
This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Queenie Dehghan whose telephone number is (571)272-8209. The examiner can normally be reached on Monday through Friday 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


STEVEN P. GRIFFIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

Application/Control Number: 10/732,705
Art Unit: 1731

Page 10

Q Dehghan